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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/662,515 | 09/16/2003 | Takahiro Yamamoto | 60188-655 | 1364 |

7590 03/12/2007

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| EXAMINER | |
|---|---|
| RAO, ANAND SHASHIKANT | |
| ART UNIT | PAPER NUMBER |
| 2621 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|---|---|---|
| 3 MONTHS | 03/12/2007 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/662,515 | YAMAMOTO ET AL. | |
| | Examiner | Art Unit | |
| | Andy S. Rao | 2621 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/16/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

**DETAILED ACTION**

***Specification***

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

***Claim Rejections - 35 USC § 101***

2. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 1-16 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

A). Claims 1 and 12 are directed towards non-statutory subject matter because they fail to recite specific steps for the production and output of a "useful, tangible, and concrete result" of the processed picture by using the claimed method and apparatus as there is no specific generated output communicated externally from the steps of the method or the elements of the apparatus, *Interim Guidelines, Section IV, paragraph C.2.b.* Correction is required.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A) Claim 1, lines 13-16, "the same frequency transform…" is vague and indefinite because it based on the claim construction it can be construed that the said "same frequency transform…" is actually the orthogonal transform mentioned in the third coding step, since a DCT transform is also a frequency transform and can also be manipulated to produce size reduced images (by the truncation of high frequency coefficients), and opposed to establishing that the same frequency transform limitation is actually a commonly applied wavelet transform for first and second searches. Correction is required.

B) Claim 1, lines 11-17, "the same frequency transform…" is vague and indefinite because it based on the claim construction it can be construed that the said "same frequency transform…" is actually the orthogonal transform mentioned in the third coding step, since a DCT transform is also a frequency transform and can also be manipulated to produce size reduced images (by the truncation of high frequency coefficients), and opposed to establishing that the same frequency transform limitation is actually a commonly applied wavelet transform for first and second searches. Correction is required.

## *Claim Rejections - 35 USC § 103*

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lempel in view of Zhang et al., (hereinafter referred to as "Zhang").

Lempel discloses an image coding method for coding a moving picture (Lempel: figures 6-7), comprising: a first step of detecting a motion vector for a current image to be coded using a reference image (Lempel: column 14, lines 5-15); a second step of performing motion compensation to the reference image using the motion vector (Lempel: column 14, lines 16-45); and a third step of coding, using orthogonal transformation, quantization and variable-length coding, a difference between the current image and the motion-compensated reference image (Lempel: column 12, lines 55-65; column 13, lines 30-55), wherein the first step includes: performing matching between the current image and the reference image to perform a first search (Lempel: column 15, lines 35-55), and the use of a frequency transform for performing a first search as in the claim (Lempel: column 16, lines 15-50), as in claim 1. However, Lempel fails to disclose if no motion vector is detected in the first search, using substantially the same frequency transform to both of the current image and the reference image and then matching between size-reduced images generated by the frequency transform to each other to perform a second search, as in the claim. Zhang discloses the use of a wavelet based multi-resolution motion estimation method (Zhang: column 2, lines 15-25) using substantially the same frequency transform to both of the current image and the reference image and then matching between size-reduced images generated by the frequency transform to each other to perform a second search (Zhang: column 8, lines 44-67; column 9, lines 1-67; column 10, lines 23) as an improvement over DCT based motion estimation in that it allows for search area expansion without the increase in

computations (Zhang: column 4, lines 49-67; column 5, lines 1-12). Accordingly, given this teaching, it would have been obvious for one of ordinary skill in the art to substitute the Zhang multi-resolutional motion estimation method into the Lempel method for the primary reference's DCT domain motion compensation in order to allow for the expansion of the search area without an increase in the computational amount. The Lempel method, now incorporating Zhang's wavelet based multi-resolution motion estimation, has all of the features of claim 1.

Regarding claim 2, the Lempel method, now incorporating Zhang's wavelet based multi-resolution motion estimation, has wherein the first step further includes determining, if no motion vector is detected in the second search, to code the current image by intra coding, instead of performing the second and third steps (Lempel: column 2, lines 35-40), as in the claim.

Regarding claim 3, the Lempel method, now incorporating Zhang's wavelet based multi-resolution motion estimation, has wherein the orthogonal transformation is DCT (Zhang: column 12, lines 55-59), as in the claim.

Regarding claim 4, the Lempel method, now incorporating Zhang's wavelet based multi-resolution motion estimation, has wherein the variable-length coding is Huffman coding (Lempel: column 13, lines 40-47), as in the claim.

Regarding claim 5, the Lempel method, now incorporating Zhang's wavelet based multi-resolution motion estimation, has wherein the frequency transform is wavelet transform (Zhang:: column 2, lines 20-25), as in the claim.

Regarding claim 6, the Lempel method, now incorporating Zhang's wavelet based multi-resolution motion estimation, has wherein the first step further includes obtaining a final motion vector for the original current image by provisionally using a motion vector detected in the

second search and referring to the original reference image (Zhang: column 6, lines 35-65), as in the claims.

Regarding claims 7-9, the Lempel method, now incorporating Zhang's wavelet based multi-resolution motion estimation, has wherein in the first step, if no motion vector is detected in the second search, the frequency transform and matching between size-reduced images are repeatedly performed until a motion vector is detected (Zhang: column 7, lines 3-67; column 8, lines 1-41), as in the claims.

Regarding claim 10, the Lempel method, now incorporating Zhang's wavelet based multi-resolution motion estimation, has wherein in the first step, whether or not to perform frequency transform to the current and reference images is determined, and if it is determined not to perform frequency transform and then no motion vector is detected in the first search, the second search is not performed and it is determined to code the current image by intra coding, instead of performing the second and third steps (Lempel: column 2, lines 35-45), as in the claim.

Regarding claim 11, the Lempel method, now incorporating Zhang's wavelet based multi-resolution motion estimation, has wherein in the first step, it is detected whether or not frequency transform has been performed in motion vector detection to a macroblock located in a position in a previous frame corresponding to that of a motion detection target macroblock, or a macroblock adjacent to the motion detectión target macroblock in the same frame (Lempel: column 22, liens 30-45), and if the frequency transform has been performed, the first search is not performed and the second search is performed (Lempel: column 23, lines 30-55), as the claim.

Lempel discloses an image coding apparatus for coding a moving picture (Lempel: figure 5), comprising: a detection block for detecting a motion vector for a current image to be coded using a reference image (Lempel: column 14, lines 5-15); a motion compensation section for performing motion compensation to the reference image using the motion vector detected by the motion detection block (Lempel: column 14, lines 16-45); and a coding block for coding, using orthogonal transformation, quantization and variable-length coding, a difference between the current image and the motion-compensated reference image (Lempel: column 15, lines 35-55), wherein the motion detection block includes: a first frequency transform section for performing a first frequency transform to the current image to generate a first size-reduced image (Lempel: column 16, lines 15-50), as in claim 12. However, Lempel fails to disclose using a second frequency transform for performing a second frequency transform which is substantially the same as the first frequency transform to the reference image to generate a second size-reduced image, and the motion detection block is so configured to be able to detect a motion vector for the first size-reduced image by referring to the second size-reduced image, as in the claim. Zhang discloses the use of a wavelet based multi-resolution motion estimation apparatus (Zhang: column 8, lines 43-63) including means for using a second frequency transform for performing a second frequency transform which is substantially the same as the first frequency transform to the reference image to generate a second size-reduced image, and the motion detection block is so configured to be able to detect a motion vector for the first size-reduced image by referring to the second size-reduced image (Zhang: column 8, lines 44-67; column 9, lines 1-67; column 10, lines 23) as an improvement over DCT based motion estimation in that it allows for search area expansion without the increase in computations (Zhang: column 4, lines 49-67; column 5, lines

1-12). Accordingly, given this teaching, it would have been obvious for one of ordinary skill in the art to substitute the Zhang multi-resolutional motion estimation element into the Lempel apparatus for the primary reference's DCT domain motion compensation in order to allow for the expansion of the search area without an increase in the computational amount. The Lempel apparatus, now incorporating Zhang's wavelet based multi-resolution motion estimation element, has all of the features of claim 12.

Regarding claim 13, the Lempel apparatus, now incorporating Zhang's wavelet based multi-resolution motion estimation element, has wherein the motion detection block includes a counter at which an upper limit for the number of repeating frequency transform can be set from the outside of the apparatus, and each of the first and second frequency transform sections has an upper limit of the number of repeating the first or second frequency transform to a current image or a reference image, the upper limit being set at the counter (Zhang: column 5, lines 25-67), as in the claim.

Regarding claims 14-15, the Lempel apparatus, now incorporating Zhang's wavelet based multi-resolution motion estimation element, has wherein the motion detection block is so configured to be able to change it operation between performing motion vector detection to the first size-reduced image and performing motion vector detection to the original current image (Zhang: column 7, lines 10-63), as in the claims.

Regarding claims 16, the Lempel apparatus, now incorporating Zhang's wavelet based multi-resolution motion estimation element, has a buffer memory for temporarily storing coded data output from the coding block (Lempel: column 10, lines 35-45); a control section for monitoring a coding amount stored in the buffer memory and instructing, based on the coding

amount, the motion detection block to perform motion vector detection to the first size-reduced image or to the original reference image (Lempel: column 14, lines 25-43), as in the claim.

## *Conclusion*

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andy S. Rao whose telephone number is (571)-272-7337. The examiner can normally be reached on Monday-Friday 8 hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571)-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andy S. Rao
Primary Examiner
Art Unit 2621

asr
March 8, 2007

ANDY RAO
PRIMARY EXAMINER